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ABSTRACT

Methods of evaluating unit operating costs and the development of the services and departments of French universities are examined. After an initial phase devoted to working out a common methodology, it was decided that the latter should be put directly to the test and that devices would have to be found to bridge the gaps in existing data, as, and when, the necessity arose. Each of the universities associated in the research project conducted a number of studies and worked out numerical evaluations set forth in separate reports. It is emphasized that the evaluations are very provisional. The main results are covered in terms of inputs available to the universities (staff, capital operation), as well as the activity and output costs. It is noted in conclusion that the retrospective knowledge of costs is only a stage, not a goal itself, and to be meaningful must be placed in its true perspective, i.e., the improvement of the decision making and management procedures of the university system. (LBH)

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Programme on Institutional Management
in Higher Education

TEACHING COSTS IN SEVEN FRENCH UNIVERSITIES

Initial Evaluations

by

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Second General Conference of Member Institutions
(Paris, 20th-22nd January, 1975)

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SUMMARY

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Note by the Secretariat

In accordance with the general principles governing the formation of the research groups associated in the Programme on Institutional Management in Higher Education the Secretariat invited seven French universities (Dijon, Grenoble II, Paris I-Panthéon Sorbonne, Paris IX-Dauphine, Paris X-Nanterre, Toulouse-le-Mirail and Toulouse-Paul Sabatier) which had expressed a common interest in cost accounting methods and budget control procedures to undertake research in this field. Since January 1973 this group which was later joined by the Catholic University of Louvain, the University of Liège (Belgium) and the University of Fribourg (Switzerland) has been working out a system for the collection and processing of data required for the evaluation of the economic costs of various university activities, particularly teaching.

The teams which were set up by the seven French universities concerned first reached agreement on the principles of a joint method for calculating various types of costs(1) and subsequently carried out a number of calculations relating to certain sectors of the above university activities(2).

The present paper is a tentative presentation in global and summarised form of the calculations designed to evaluate the cost of a certain number of teaching activities performed in 1971-1972 in the universities which took part in the project.

The Centre for Educational Research and Innovation (CERI) wishes to thank Professor Gilbert Abraham-Frois, author of this global report and the leaders and members of the teams responsible, in their respective universities, for the arduous task of collecting and processing the data required for the calculation of these costs.

The necessary resources for the financing of all the work done by the group of French universities was allocated to them by:

- the French Ministry of Education
- the Société Shell-Française, in the form of a donation to CERI

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1) "Method of calculating unit activity and output costs in French universities" by A. Babeau, Cl. Cossu, S. Cuénin [IMHE/GC/74.307].

2) "Calculs de Coûts dans les universités françaises - Résultats numériques des travaux réalisés par sept universités" [IMHE/GC/74.31; in French only].

INTRODUCTION

The results which are submitted in this brief report were obtained by seven universities(1) in the context of a research project on methods of evaluating unit operating costs and the development of the services and departments (UERs) of French universities. After an initial phase devoted to working out a common methodology(2) it was decided that the latter should be put directly to the test and that devices would have to be found to bridge the gaps in existing data, as and when the necessity arose.

With this object in view each of the universities associated in the research project conducted a number of studies and worked out numerical evaluations which were set forth in separate reports. It was felt useful to attempt a synthesis of these results although the present paper does not claim to cover them in their entirety. Attention must once again be drawn to the very fragile and provisional nature of the evaluations.

Part one covers the main results in respect of the major types of inputs available to the universities (staff, capital operation) while part two is concerned with the studies and evaluations, dealing first with the activity costs and subsequently the output costs.

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1) Dijon, Grenoble II (Social science universities), Paris I-Panthéon Sorbonne, Paris IX-Dauphine, Paris X-Nanterre, Toulouse le Mirail, Toulouse Sabatier.

2) "Method of calculating unit activity and output costs in French universities" by A. Babeau, C. Cossu, and S. Cuénin [IMHE/GC(74)30].

EVALUATION OF INPUTS

The studies conducted by the universities associated in the current research project have produced a number of figures reflecting the cost of the principal inputs available to the universities. In the exercise of their functions the universities use three types of inputs i.e. personnel, capital assets and operating funds, the latter being supplemented by appropriations for student aid.

The following pages contain numerical data on the following items:

- Capital costs
- Staff costs
- Operating costs

It will be noted that in the context of the present study it has not been possible to calculate transfer costs (in the sense of direct aid to students)(1). Supplementary research would be desirable to take these transfer costs into account.

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1) For a survey of transfer costs please consult: "Method of calculating unit activity and output costs in French universities" by A. Babeau, C. Cossu, S. Cuénin, Chapter III [IMHE/GC/74.307].

I. CAPITAL COSTS

As cost evaluation is practically excluded from French public accounting it was necessary first to work out a common methodology(1) and subsequently to compile the data required for evaluation. The results obtained are shown in the tables below with a note on the exact calculation procedure used in each university. The options jointly adopted and the incidental problems will be clear from a number of general comments.

To obtain comparable results and avoid excessive calculation, the universities had to agree on the actual cost concept they should adopt. At this stage in the project it was not felt indispensable to introduce at the outset the idea of opportunity costs which would have brought into play a more strictly economic type of cost (this would have meant applying a rate of interest to the fixed capital to take account of the financial charge represented by the funds thus tied up and its resulting cost to the community). Provisionally and tentatively it was considered preferable to remain at the level of current management and use the method of accounting costs as reflected in depreciation.

Inasmuch as the same concept is used by all the universities it is arguable that there is no risk of inconsistency at this level and that the divergences between one university and another which emerge from calculations based on accounting costs would be identical if the calculations were based on economic costs(2).

This situation is not entirely due to the land problem. Obviously, it may be argued that the life of a piece of land is unlimited and that there is therefore no reason for depreciation. But if its alternative uses are considered, there is certainly a financial charge representing the product of the present value multiplied by the rate of interest. The use of the accounting cost method, however, completely eliminates land from the capital costs as it is not subject to depreciation. This leads to an underestimate which is all the more significant when it is remembered that universities cover a considerable area of land and are also situated in localities where land is particularly dear.

This point having been made, the treatment of the actual premises merits some comment. As far as the lifetime of the fixed assets is concerned, the figure adopted in all universities (with perhaps a certain optimism) is 50 years. Depreciation was based on replacement value for which the calculation procedure is shown in each case in the

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1) "Method of calculating unit activity and output costs in French universities" (A. Babeau, C. Cossu, C. Cuénin), Chapter III.

2) Provided of course that the fixed assets are given an identical working life, a point we shall revert to later. It may be noted, as an example, that the cost of depreciation on buildings is multiplied by 5 in the transition from accounting costs to economic costs, as the standard formula for constant annual instalments adopts an interest rate of 10 per cent and 50 years for the life of a building. See the report by Paris IX-Dauphine in "Calculs de coûts dans les universités françaises" /IMHE/GC/74.31/.

attached tables. However, the diversity of the buildings concerned is such that any comparison based on the figures provided can only be made with the greatest caution. What is there in common for example between the value of the buildings of Paris IX-Dauphine (estimated on the basis of the transfer from NATO to the Ministry of Education in 1968) and the buildings of Toulouse-le-Mirail or Grenoble II (calculated from the ministry specifications of the period)? As far as Paris I-Panthéon Sorbonne is concerned, it was considered advisable not to attempt any evaluation in view of the time available, for these buildings are shared by several universities and are also classified as historical monuments. All the other universities, where the situation was generally less complex, submitted evaluations which, it must be emphasized, are provisional. These at least provide a preliminary groundwork for our study in view of the fact that university accounting has so far never taken account of capital assets.

Calculating the depreciation of equipment and furniture (see column 2 of the table) involved a number of difficulties. The method is not the same from one university to another and it is therefore pointless to attempt to compare universities under this heading.

The most normal method is to proceed from an inventory of the various items (teaching, administrative and technical equipment) and calculate their replacement value, specifying the lifetime of each item(1). When the study began there was little or no inventory information of this kind. Certain research teams consequently devoted much of their effort to the drudgery of compiling and evaluating this inventory. This was the case as regards Paris I where several months' arduous work were done on this task. The preparation of an inventory of items, their valuation at replacement prices and the calculation of straight-line depreciation over five to fifteen years according to the item made it possible to work out an annual depreciation figure for furniture and equipment by types of premises. At Paris X-Nanterre the inventory method was adopted for the university central services but for the other premises use was made of a second method.

In fact another and more rapid method is conceivable and certain universities did well to explore its possibilities pari passu with the first method. When premises are built there are always two major sources of funds, i.e. two main appropriations. One is for the construction of the premises and the other for their equipment (the second representing more or less 15 per cent of the first, in the case in which we are concerned). This represented a body of furniture and equipment for which it was experimentally proposed to adopt a depreciation period of 15 years. Although this rapid method facilitates calculations it disregards a number of problems.

- Does this equipment and furniture consist solely of what is known as "initial equipment"? It is of course a fact that universities acquire a number of items of equipment each year from their annual appropriations. Do these purchases represent new equipment or are they merely the replacement of initial equipment which is worn out or obsolescent? The University of Dijon considered that in its particular case this equipment was largely new. The other universities (among those which had not used the inventory method) mostly took the other view. These were of course specific cases. It is impossible to answer the above question in the absence of any systematic inventory and the need for such an inventory is therefore quite clear.

- Emphasis should be laid on a further point which arises from the assumptions adopted not only as regards the life of the fixed assets (50 years for buildings, 15 years for "initial equipment") but also as regards the value of the initial equipment (estimated

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1) See "Method of calculating....." op.cit.

CAPITAL COST PER USABLE M^2 (disregarding opportunity costs)

PREMISES	DEPRECIATION ON BUILDINGS	DEPRECIATION ON EQUIPMENT AND FURNITURE	TOTAL	COMMENTS
PARIS I PANTHEON SORBONNE				a) These figures are not significant. In view of the complexity of the problems relating to the premises of the University of Paris I it was decided not to consider replacement value but the building costs of more recent universities. The figure used by Paris I (Frs.67 per m^2 for depreciation on buildings) is therefore not comparable with that of the other universities.
University central services	(a)	97	(a)	
UER administration	(a)	36	(a)	
Teaching	(a)	13	(a)	
Research	(a)	37	(a)	
PARIS IX DAUPHINE	100 (b)	28 (c)	128	b) Building depreciation over 50 years; annual depreciation calculated from figure at which the NATO building was transferred to the Ministry of Education in 1968, this figure being discounted to allow for the rise in prices. c) Revaluation of the equipment and furniture from inventories; depreciation from 5 to 15 years as appropriate
PARIS X-NANTERRE				d) Building depreciation over 50 years, calculated from the building costs, the figure being discounted to allow for the rise in prices. e) Annual depreciation for the various premises being calculated by adopting a 15-year depreciation period for initial equipment (discounting the values to allow for the rise in prices). In addition, annual depreciation allowances were applied to premises other than amphitheatres as the latter had practically no furniture.
Buildings A, B, C, D, E				
- All-purpose premises	58 (d)	32	90	
- Amphitheatres	58	- (e)	58	
Building F				
- All-purpose premises	50	26	76	
- Amphitheatres	50 (d)	- (e)	50	
Building G				
- All-purpose premises	49	40	89	
- Amphitheatres	49 (d)	- (e)	49	

CAPITAL COST PER USABLE M^2 (disregarding opportunity costs)(continued)

PREMISES	DEPRECIATION ON BUILDINGS	DEPRECIATION ON EQUIPMENT AND FURNITURE	TOTAL	COMMENTS
PARIS X-NANTERRE				
Central Services:				
- Director's office and attached services		15 (c)		
- Student services		17 (c)		
- Staff		47 (c)		
- Computer service		297 (c)		
- Miscellaneous facilities		90 (c)		
DIJON				
Law and economic sciences	56 (d)(i)	16 (i)	72 (i)	
GRENOBLE II				
Law, economics, history	24 (f)	12 (g)	36	
Psychology			13 (h)	
Philosophy	38 (f)	19 (g)	57	
I.E.A.	22 (f)	12 (g)	34	
I.E.C.	26 (f)	13 (g)	39	
TOULOUSE LE MIRAIL	24 (f)	12 (g)	36	
TOULOUSE SABATIER	34 (f)	13 (g)	47	

f) Building depreciation over 50 years. Value of capital assets calculated from building costs based on ministry specifications.

g) Cost of initial equipment evaluated at 15 per cent of the building costs and depreciated over 15 years.

h) In the case of the Grenoble psychology U.E.R., depreciation calculations were made for only some of the premises as most are more than 50 years old.

i) In the case of Dijon figures are available for the years 1970/71 and 1972/73 (see the Dijon report page).

at 15 per cent of the building costs). A building estimated to have a replacement value of 100 and depreciated over 50 years involves an annual depreciation figure of 2. The depreciation of the initial equipment (15 per cent of the building costs) over 15 years represents an annual depreciation provision of 1. As an annual charge this means that depreciation on equipment represents 50 per cent of depreciation on actual building and this is confirmed by the figures submitted by Grenoble II and Toulouse-le-Mirail. Can this be verified by the fuller and more detailed inventory method? In the event, the only figures which are more or less comparable are those of Paris IX-Dauphine where the depreciation on equipment and furniture is only 28 per cent of depreciation on actual building but it is impossible to ascertain whether the latter percentage is not due to the fact that the annual depreciation figure for the buildings of Paris IX-Dauphine is particularly high.

The more detailed figures furnished by Paris I and Pariz X reveal the whole complexity of the problem. At Paris X the depreciation on buildings per usable square metre varies considerably as it is (between Frs.49 and Frs.58) while depreciation on material and furniture (per usable square metre) varies between Frs.26 and Frs.40 for all-purpose premises and is considered as nil in the case of the amphitheatres (where equipment and furniture were put down as negligible as a first approximation). The use of the inventory method shows considerable discrepancies in the central services themselves (even if we disregard the specific problems entailed by data processing equipment). The very detailed investigations conducted at Paris I reveal appreciable differences. According to the type of premises concerned the annual charge for equipment and furniture varies from Frs.13 per usable square metre for classrooms to Frs.97 for the premises occupied by the general services of the university.

There is indeed a further reason to avoid comparing these figures too hastily. To pave the way for subsequent calculations and the assignment of building costs to the elementary units of activity in each university it was decided to calculate the capital costs per usable square metre, i.e. to exclude entrance halls, landings, staircases, corridors, storerooms, basements, toilets, etc. This does not of course mean that the relevant costs should be disregarded or that these areas should be considered useless. The cost of using them is regarded as nil because their real cost is apportioned to the "usable" areas, i.e. the areas occupied by the elementary units of activity. This may be the source of many discrepancies as the ratio of usable area to total area varies considerably from one university to another. For example at Grenoble and Toulouse-le-Mirail the ratio varies from 70 to 80 per cent according to the premises and amounts to 56 per cent at Dijon, whereas at Paris IX-Dauphine one-third of the total space consists of landings, corridors, etc., one-third of usable floor space and one-third of parking space.

There may consequently be a tentative explanation for some of the discrepancies noted. But there is no doubt that both retrospective costing and management planning in universities are only possible by calculating costs as a whole, and particularly capital costs which have hitherto been unduly neglected.

II. STAFF COSTS(1)

II.1 GENERAL PROBLEMS

The first problem which had to be settled was the cost concept which would be adopted. Although the use of opportunity costs was desirable if decision-making was to be improved it was rapidly realised that it was difficult for an institution to go very far in estimating this type of cost when its concern was to remunerate its staff. For this reason the accounting cost method was adopted.

Moreover, although a university could easily estimate its staff costs by reference to its budget when the staff are remunerated from that budget, the real cost of staff remunerated directly from the Ministry of Education budget was much more difficult to ascertain.

A complete conspectus of the costs entailed in the employment of staff can only be obtained at national level as certain cost components do not depend on the Ministry.

As the calculation of the cost of each employee brings a wide range of factors into play several methods of calculation may be conceived.

1) Estimation of cost components

Numerous charges have to be added to the principal remuneration paid to an employee. Since we approached the problem from the angle of the employer, i.e. the Ministry of Education, these charges were estimated from the employer's contributions. But if we had been concerned with estimating the cost to the country as a whole the evaluation would have been based on benefits actually provided.

It does not seem necessary to enumerate all the components which have to be taken into account. We may merely note that the gross indexed salary was supplemented by a number of allowances drawn by the employee on various grounds, the fiscal and social charges being borne by the employer. A distinction was made according to the status of the employee (whether or not established) and according to the budget from which the employee was paid (national or university budget).

It will also be noted that no attempt was made to estimate the cost of retirement pensions paid by the state in the case of established staff remunerated from the national budget.

2) Method of collecting the cost components

As several parameters have to be taken into account in determining the cost of each employee it was necessary to devise a method of collecting these components so as to reflect the maximum number of variations in the parameters (promotion, changes in family status, transfers of staff, etc.).

Two methods were proposed for this purpose:

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1) See "Method of calculating ....." etc.(IMHE/GC/74.30)

- the first method evaluates the cost from the employee's remuneration index: the main concern is to ensure maximum facility in collecting the data and also sufficient accuracy. It implies computerisation, as the maximum basic data are inserted in the form of parameters in order to limit the number of items of information which have to be collected, the latter being obtained from the staff files;

- in the second method the employee's remuneration components are obtained by direct reading and the cost per employee is ascertained from a simple formula.

The choice between these two methods depended on the user's requirements and circumstances:

- the first method was more suitable for use in universities which had records going back over a long period and required information on the trend in their staff costs without having to waste time collecting information on remuneration already paid or which had recorded data in a form suitable for direct computerisation;

- the second method could be used in universities which wished to find out the cost of their staff over a short period.

In any event, both methods produced the same results.

However, for various reasons (time required to devise collecting methods, number of employees, etc.) a sample survey was carried out in certain universities and the cost components were collected in the month or months assumed to be the most representative of the year 1971/72.

II.2 TEACHING STAFF

As one of the Group's objectives was the calculation of unit activity costs, the costs calculated by the above methods had to be assigned to the elementary units of teaching activity.

The diversity in the structure of the universities of the French-speaking Group and in their teaching staff made it difficult to work out a standard approach. Furthermore, as certain subjects were taught in normal hours of service while others were taught in overtime hours a certain amount of smoothing was necessary to iron out any cost differences which were too arbitrary for our purposes (calculation of average and retrospective unit costs). The final costs therefore include remuneration received for extra teaching hours.

There also arose the inevitable problem of the activities of the teaching staff. The latter could be considered as responsible for three types of university activity, i.e. teaching, research and administration. As it was impossible to carry out surveys of the teachers' time budget in all the universities of the Group(1) the universities

1) The only survey available at present was conducted among teaching staff of all grades at the economic science U.E.R. of the University of Paris X Nanterre. (A similar survey is in progress at the University of Paris I Panthéon Sorbonne.) The results of the Nanterre survey based on interviews of an adequate number of teachers may be summarised as follows:

Time Budget of Economic Science Teachers at Paris X Nanterre

Teachers Activities	Professors and Senior Lecturers (maîtres de conférences)	Lecturers (maîtres-assistants)	Assistants
Teaching	50%	50%	50%
Research	25%	40%	40%
Administration	15%	7%	5%
Miscellaneous	10%	3%	5%

These results obviously cannot be extrapolated to other disciplines or other universities without additional in-depth research.

(as a provisional assumption and purely to ensure homogeneous results) adopted a theoretical time budget for all disciplines and all "permanent" teachers (excluding "vacataires", i.e. temporary outside assistants).

The breakdown adopted was as follows:

50 per cent: teaching activity;

50 per cent: research activity;

0 per cent: other activities (the latter were not omitted but their cost was assumed to be nil in this preliminary phase).

This breakdown can therefore be applied to all the costs borne by the employer (basic salary, various allowances, overtime teaching, and fiscal and social charges borne by the employer).

To ensure significant comparisons teaching staff were divided into fairly homogeneous groups based on their particular status. The homogeneity of the groups was based on several criteria:

a) Status

The following groups were formed:

- professors and "maîtres de conférences", i.e., senior lecturers (and "chargés d'enseignement" in arts and science);
- maîtres-assistants (lecturers);
- assistants;
- "chargés de cours" (lecturers in law and economic sciences);
- "lecteurs" (junior assistants, in arts);
- "vacataires" (temporary outside assistants).

The composition of the latter group varied according to the approach adopted:

* First approach: all outside assistant teachers in a given U.E.R. would be considered as "vacataires". In this case the group would consist of:

- persons from outside the university;
- teaching staff already drawing remuneration for their principal activity within the university but belonging to another U.E.R.

Although this approach was not recommended by the majority of the Group it had to be adopted in several cases particularly in calculations restricted to a single U.E.R.

* Second approach: only persons from outside the university were considered as "vacataires".

In this case the cost to a given U.E.R. of employing a teacher from another U.E.R. was measured by reference to the average cost of the teaching provided by the person in question (this average cost, estimated individually or by group, was determined in the same way as for teaching staff belonging to the U.E.R. concerned).

The very rare case in which staff teach in several universities as part of their normal service was left out of account. They were considered as "vacataires", (temporary outside assistants).

This method of reference to groups of teaching staff entailed a further series of difficulties when the second criterion came into play.

b) The teacher's special subject.

The classification of teaching staff in groups was with reference not only to their grade but also their speciality. The problems which the introduction of this criterion involved will readily be appreciated. For example, should an average cost be calculated for lecturers (maîtres-assistants) in a U.E.R.? In that case the maîtres-assistants who teach in pluri-disciplinary U.E.R.s and specialise in widely different disciplines would

not be interchangeable. The problem might appear simpler in a mono-disciplinary U.E.R. but, to return to our example, lecturers (maîtres-assistants) in a language U.E.R. are not interchangeable.

To avoid having to break down the university into disciplines it was decided that:

- in the case of mono-disciplinary U.E.R.s the only cost calculated would be an average cost per group of teaching staff;
- in the case of pluri-disciplinary U.E.R.s a more detailed evaluation might be made by dealing with the major disciplines separately. This solution was adopted in the case of the science U.E.R.s at Dijon and Toulouse-Paul Sabatier.

The table on the next page shows the principal choices made by the universities belonging to the Group.

In view of the above explanations it is now possible to make a number of comparisons in respect of the cost of teaching staff.

The tables which follow show, for each university, the average cost per actual hour of teaching in respect of each discipline investigated in the context of the present research and the groups of teachers concerned. In accordance with the theoretical time budget adopted the figures shown in these tables represent only 50 per cent of the total cost of the teaching staff (except for "vacataires", i.e. outside assistants).

Whenever more than two results were observed an average figure was calculated.

I. PROFESSORS, SENIOR LECTURERS (MAITRES DE CONFERENCES) AND LECTURERS (CHARGES D'ENSEIGNEMENT)

Average cost per actual hour of teaching in 1971-1972

UNIVERSITIES U.E.P.s or major disciplines	PARIS I	PARIS IX	PARIS X	DIJON	GRENOBLE II	TOULOUSE LE MIRAIL	TOULOUSE PAUL SABATIER	AVERAGE
Economic Sciences(1)	500		382	366	400			412
Management	443	386			321			383
Law				275	433			
History(2)			427		299	413		380
Philosophical and Political studies					380	458		
Behavioural and Educational Sciences(3)					262	320		
Social Sciences						284		
Arts and Classical Languages						422		
Modern Arts						304		
Geography						374		
Languages						357		
Mathematics Computer Sciences				369			238	
Physics				398			290	
Chemistry				338			440	
Biological Sciences(4)				393			278	
Earth Sciences				364			298	
Business Institute (Institut d'études commerciales)						236		

1) At Dijon and Toulouse Le Mirail: economic sciences and management.

2) At Toulouse Le Mirail: history, archeology and history of art.

3) At Grenoble II: psychology.

4) At Dijon: life sciences.

N.B. In accordance with the theoretical time budget adopted as a working assumption the figures shown in these tables represent only 50 per cent of the total cost of the teaching staff.

UNIVERSITIES			PARIS I	PARIS IX	PARIS X	DIJON	GRENOBLE II	TOULOUSE LE MIRAIL	TOULOUSE PAUL SABATIER
Number of reference months used in the survey			12	12	2	12	1	1	12
Method of estimating the costs of teaching staff	at individual level		X						
	at group level	for the U.E.R. as a whole		X	X	(Law and economic sciences) X	X		
		dealing separately with the special subjects taught by the U.E.R.				X (Science U.E.R.s)		X (Language sections)	X (1)
the term "vacataire" is applied to	staff from outside the U.E.R.						X		(2)
	staff from outside the university		X	X	X	X		X	(2)

1) At the University Paul Sabatier teaching staff are not permanently attached to U.E.R.s. Calculations are based on relatively homogeneous groups of disciplines.

2) There are no outside assistants (vacataires) at the University Paul Sabatier.

II. LECTURERS (MAITRES-ASSISTANTS)

Average cost per actual hour of teaching in 1971-1972

UNIVERSITIES U.E.R.s or major disciplines	PARIS I	PARIS IX	PARIS X	DIJON	GRENOBLE II	TOULOUSE LE MIRAIL	TOULOUSE PAUL SABATIER	AVERAGE
Economic Sciences(1)	312		279	(176	268	128		233
Management	321	157		(	139			206
Law				125	175			
History(2)			194		214	179		196
Philosophical and Political studies					206	173		
Behavioural and Educational Sciences(3)					172	137		
Social Sciences						100*		
Arts and Classical Languages						184		
Modern Arts						177		
Geography						156		
Languages						156		
Mathematics Computer Science				154			75**	
Physics				149			173**	
Chemistry				144			152**	
Biological Sciences(4)				198			198**	
Earth Sciences				123			210**	
Business Institute (Institut d'études commerciales)								

1) At Dijon and Toulouse le Mirail: economic sciences and management.

2) At Toulouse le Mirail: history, archeology and history of art.

3) At Grenoble: psychology.

* One person only.

** Lecturers and assistant lecturers (maîtres-assistants and assistants) are in one group as they are in charge of supervised and practical work.

4) At Dijon: life sciences.

N.B. In accordance with the theoretical time budget adopted as a working assumption the figures shown in these tables represent only 50 per cent of the total cost of the teaching staff.

III. ASSISTANTS(*)

Average cost per actual hour of teaching in 1971-1972

UNIVERSITIES U.E.R.s or major disciplines	PARIS I	PARIS IX	PARIS X	DIJON	GRENOBLE II	TOULOUSE LE MIRAIL	TOULOUSE PAUL SABATIER	AVERAGE
Economic Sciences(1)	140		129	(103	137	(123		126
Management	138	86		(	71	(		
Law				103	85			
History(2)			232		151	162		
Philosophical and Political studies					130	184		181
Behavioural and Educational Sciences(3)					107	116		
Social Sciences						135		
Arts and Classical Languages						177		
Modern arts						167		
Geography						154		
Languages						156		
Mathematics Computer Science				106			75**	
Physics				122			173**	
Chemistry				102			152**	
Biological Sciences(4)				135			198**	
Earth Sciences				91			210**	
Business Institute (Institut d'études commerciales)					90			

1) At Dijon and Toulouse le Mirail: economic sciences and management.

2) At Toulouse le Mirail: history, archeology and history of art.

3) At Grenoble II: psychology.

* In law, economics and management, the assistants are mostly responsible for supervised work.

** Lecturers and assistants (maîtres-assistants and assistants) are in one group as they are responsible for supervised work and practical work.

4) Dijon: life sciences.

N.B. In accordance with the theoretical time budget adopted as a working assumption the figures shown in these tables represent only 50 per cent of the total cost of the teaching staff.

IV. OUTSIDE PERSONNEL (VACATAIRES)

Actual cost per actual hour of teaching in 1971-1972

UNIVERSITIES U.E.R.s or major disciplines	PARIS I	PARIS IX	PARIS X	DIJON	GRENOBLE II	TOULOUSE LE MIRAIL	TOULOUSE PAUL SABATIER	AVERAGE
Economic Sciences(1)	89(a) 99(b)		102(a) 94(b)	81	82	80		
Management	86(a) 99(b)	89			84			
Law				82	86			
History(2)			94(a)		81	77		
Philosophical and Political Studies					80	79		
Behavioural and Educational Sciences(3)					82	80		
Social Sciences						80		
Arts and Classical Languages						77		
Modern Arts						78		
Geography						80		
Languages						78		
Mathematics Computer Science				80				
Physics				85			*	
Chemistry				83			*	
Biological Sciences(4)				92			*	
Earth Sciences				82			*	
Business Institute (Institut d'études commerciales)					80			

1) At Dijon and Toulouse le Mirail: economic sciences and management.

2) At Toulouse le Mirail: history, archeology and history of art.

3) At Grenoble II: psychology.

* There are no outside teachers (vacataires) at Toulouse Paul Sabatier.

4) At Dijon: life sciences.

a) Teaching.

b) Supervised work.

N.B. In accordance with the assumptions adopted, the figures shown in this table represent 100 per cent of the total cost of the teaching staff.

V. OTHER CATEGORIES OF TEACHING STAFF

Average cost per actual hour of teaching in 1971-1972

UNIVERSITIES U.E.R.s or major disciplines	PARIS I	PARIS IX	PARIS X	DIJON	GRENOBLE II	TOULOUSE LE MIRAIL	TOULOUSE PAUL SABATIER	AVERAGE
Economic Sciences(1)	248***		226*	141*	237*			
Management	293***							
Law				194*	210*			
History(2)								
Philosophical and Political Studies								
Behavioural and Educational Sciences(3)								
Social Sciences								
Arts and Classical Languages								
Modern Arts								
Geography								
Languages						83**		
Mathematics Computer Science								
Physics								
Chemistry								
Biological Sciences(4)								
Earth Sciences								
Business Institute (Institut d'études commerciales)								

1) At Dijon and Toulouse Le Mirail: economic sciences and management.

2) At Toulouse Le Mirail: history, archeology and history of art.

* Lecturers (chargés de cours).

** Junior assistants (lecteurs).

*** Assistants responsible for formal lectures.

N.B. In accordance with the theoretical time budget adopted as a working assumption, the figures shown in these tables represent only 50 per cent of the total cost of the teaching staff.

These initial results call for a number of comments. They should be handled with caution as they are not entirely free from error: most of them have had to be compiled a posteriori and the system used by the various universities to record and process their files cannot be considered absolutely reliable for reasons which are well known.

II.2.1 INTER-GROUP COMPARISON:

Disregarding the last group (Table V) which is too heterogeneous, a first reading shows differences which although expected are worth some attention.

The average cost per actual hour of teaching in group I (professors, maîtres de conférences, chargés d'enseignement) appears as Frs.357 i.e. approximately twice the average cost (Frs.182) for group II representing maîtres-assistants which is itself about 40 per cent higher than the average hourly cost (Frs.134) of the assistants (group III), while the latter figure is more than 50 per cent higher than the average cost per hour (Frs.85) for outside teachers (vacataires) representing group IV.

It must first be noted that the discrepancy between the first three groups and the last (vacataires) is largely due to the working assumptions provisionally adopted by the Group. It will be remembered that in accordance with the theoretical time budget adopted the figures in the tables represent 100 per cent of the total cost of outside teachers (group IV) but only 50 per cent in the case of the other groups. This no doubt explains why, for example, the difference between groups III and IV is smaller than was probably anticipated. Similarly, it is probably more judicious to limit comparisons to categories of teachers for which the same assumption (50 per cent) was made.

Even with this restriction the figures should not be compared without precautions. For example, it should be remembered that the average cost per actual hour of teaching is approximately twice as much in group I (professors, maîtres de conférences, chargés d'enseignement) as in group II (maîtres-assistants). We also know that maîtres-assistants are statutorily required to put in twice as many hours of service in general as the first group. A hasty comparison of these figures might suggest that the differences in unit costs are due solely to differences in service requirements and that the average monthly salary is therefore the same for both groups. As this is not so, it may be inferred that there are other factors which explain why the differences in average cost between the two categories are slighter than was expected.

In particular, the heterogeneous nature of these groups ought probably to be taken into account (group I covers not only professors but maîtres de conférences and chargés d'enseignement) and the analysis might be improved by more detailed processing. For example, the difference between the average costs of groups I and II will be lower if the proportion of maîtres de conférences to professors is higher in group I. Indeed, this group is extremely heterogeneous as will be seen from the research done by Grenoble II(1) and Toulouse Le Mirail(2).

In the latter case, the average cost per hour of teaching in category II (maîtres-assistants) is Frs.162 taking the whole of the university into account and Frs.362 as compared with the whole of category I but within this category the differences are also comparable in scale i.e. Frs.225 per hour in the case of a senior lecturer (Maîtres de conférences) and Frs.449 per hour for a professor. This means that although the analysis of the composition of group I should certainly not be neglected we fell that the explanation of the fact that the difference between the average costs of categories I and II

1) IMHE/GC/74.30
2) IMHE/GC/74.30

is less than was expected should be looked for elsewhere. It is largely due to the manner in which the group as a whole chose to consider the question of overtime teaching hours. As it is impossible in practice to make a distinction between the normal service of a teacher and the hours of overtime for which he is remunerated it was decided to calculate an average cost per actual hour of teaching. This has two consequences which must be emphasized:

- the first is well known; as the hour of overtime is remunerated at a rate which falls considerably short of that recorded per hour of statutory teaching the more hours of overtime teaching there are the lower the average hourly cost is. This is a typical case, well known to economists, in which the marginal cost is lower than the average cost. This argument is of course not concerned with questions of quality and quantity;

- the second consequence must, however, be approached with somewhat greater precision as it directly affects our argument. The percentage of teaching done in overtime hours is not the same everywhere and is not identical among all teaching staff. The research done by Grenoble II and Toulouse Le Mirail points in the same direction: professors and maîtres de conférences do relatively more overtime teaching than maîtres-assistants. We will not go into the causes of this factor(1) but will note the consequences which are that the average cost per actual hour of teaching done by the first group will be much lower than the average cost recorded for the second group. This is clear from the attached table which was compiled from the figures worked out by the University of Toulouse Le Mirail for all disciplines in the course of the year 1971-1972.

It is in fact very clear that the greater the percentage of teaching in the form of overtime the lower is the cost per actual hour of teaching as compared with the average cost per statutory hour.

II.2.2 INTER-UNIVERSITY COMPARISON: the conclusions which may be drawn from the second type of comparison are necessarily limited owing to the wide range of situations and the fact that the field of investigation covers a large number of disciplines. In actual fact there are hardly more than two or three disciplines (economic sciences, management, history) in which the number of results observed exceeds two. In these circumstances it would be premature to draw conclusions. At best, a few working assumptions may be suggested.

The heterogeneous nature of academic status and the statutory terms of service make a comparison concerning both group II and group III particularly difficult. It is for example a fact that the body of maîtres-assistants in law and economic sciences is a comparatively recent creation and its numbers are small. It is also a fact that there are appreciable differences between assistants in one discipline and another in respect of status, remuneration and employment. Furthermore, Toulouse-Sabatier which is a science university has, owing to local circumstances, combined maîtres-assistants and assistants in one group as they are responsible for supervised work and practical work. This means that no systematic analysis of the divergences which are very largely due to statutory differences can be considered in our present study.

Without dwelling further on the heterogeneous nature of group I it is probable that the comparatively high proportion of professors in this group accounts for the fact that Paris I recorded a higher cost in economic sciences and management than Paris IX,

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1) It may be noted in passing that it is obviously easier to perform a large proportion of one's total service in the form of overtime when one's hours of statutory service are few.

ADDITIONAL DATA SHOWING THE SENSITIVITY OF TEACHING COSTS TO THE PERCENTAGE OF OVERTIME TEACHING:

Example furnished by Toulouse Le Mirail

Category of teaching staff	(1) Average cost per statutory hour*	(2) Relative difference in average costs per statutory hour	(3) Average cost per actual hour	(4) Relative difference in average costs per actual hour	(5) Ratio of average costs per actual hour to average costs per statutory hour	(6) Percentage of teaching in the form of overtime hours
Professors	595	3.1	449	2.7	0.75	27%
Maîtres de conférences	425	2.3	225	1.4	0.52	39%
Professors and maîtres de conférences (group I)	520	2.9	362	2.2	0.69	33%
Maîtres-assistants (group II)	180	1	162	1	0.90	12%

* In accordance with the theoretical time budget adopted as a working assumption, the figures shown in these tables represent only 50 per cent of the total cost of the teaching staff.

Paris X, Dijon and Grenoble II. The same factor explains why the average cost per actual hour at Paris I is appreciably higher in economic sciences proper (Frs.500) than in management (Frs.443).

The comparatively high cost at Paris I is undoubtedly aggravated by the influence of the age pyramid and to a lesser extent by the residence allowance (higher in the Paris area).

There are two factors which merit closer attention. The first is the number of hours of statutory service worked by each category of teaching staff for it is obvious that the average cost tends to decline when there is an increase in the statutory hours of service of a given category. Inasmuch as statutory service is habitually expressed in hours per week (e.g. 3 hours of teaching for professors) the only variable is the duration of the university year. However, it was established that in practically all the universities concerned teaching is programmed over 25 working weeks (disregarding the organisation of end-of-year examinations) and the number of hours worked is not therefore an explanatory variable. The one exception is Paris IX Dauphine where for reasons which it is unnecessary to dwell upon here university teaching is programmed over 30 weeks and this has proportionately reduced the average cost per actual hour of teaching.

The overtime variable already referred to does admittedly constitute an explanatory variable but is only one among others.

However, it will be noted for example that at the University of Grenoble II where the percentage of overtime is higher than at Toulouse le Mirail, the average cost per hour of teaching by maîtres-assistants in three disciplines is higher (whereas the opposite might perhaps have seemed more logical). But the explanation is simple: first, the divergence between the two universities is not very great as far as the overtime proportion of teaching is concerned, and secondly it is obvious that the other explanatory variables are an important factor in accounting for this exception.

Category of teaching staff	University of Grenoble II		University of Toulouse le Mirail	
	Average cost per actual hour	Percentage of overtime teaching	Average cost per actual hour	Percentage of overtime teaching
Maîtres-assistants, history	214	14%	179	6%
Maîtres-assistants, psychology	172	18%	137	12%
Maîtres-assistants, philosophy	206	7%	173	0%

II.2.3 *Intra-university comparison: The above results may be used and actually have been used for each university separately, i.e. determination of direct cost of teaching staff by cycles, degree courses and years..... A detailed illustration of this type of consideration will be found in the report submitted by Paris IX Dauphine in which different methods are used to analyse and compare the cost of credits by diploma and by disciplines.

II.3 ADMINISTRATIVE, TECHNICAL, MANUAL AND SERVICE STAFF

It is not the purpose of the present study to give an account of the whole of the work done on this subject by each university. It must be said that the method used in

this connection is quite different from that adopted in respect of teaching staff by the Group as a whole. In the latter case each university submitted an estimate of the cost of teaching staff in the form of an average per group of staff at U.E.R. level with a view to providing data for comparison. This was neither possible nor desirable as far as non-teaching staff are concerned. On the one hand the job structure is appreciably different, for example, in science universities from the structure in arts or law-oriented universities. On the other hand remuneration definitely depends on job categories which present an extraordinarily wide spectrum. In these circumstances the universities generally calculated individual costs rather than group costs (as in the case of teaching staff), but the general approach, which was to record all costs involved in the job, was of course adhered to. There are, however, a few studies of more general interest:

- at Toulouse le Mirail a detailed study was made by categories, i.e. administrative, technical, manual, service and outside staff. In addition, a total and an hourly cost were worked out. Hourly cost was calculated on the basis of an annual average activity of 1800 hours for administrative and/or service units. This hourly cost per category is as follows:

. hourly cost of administrative staff 12.70
. hourly cost of technical staff 14.34
. hourly cost of service staff 10.07
. hourly cost of outside staff 12.00

The conclusion drawn from this study is, in our view, a fundamental one and for that reason we will quote it in full: "At university level we have for example noted the relatively low hourly cost of administrative staff as compared with that of technical staff. This situation which cannot be justified might account for the scarcity of highly qualified staff in responsible positions in the administrative services of French universities which is due in one respect to inadequate remuneration";

- at PARIS X Nanterre an attempt was made to reclassify all types of staff, whatever their status, in easily identifiable categories by adopting the classification used in the public service and taking as a criterion the qualifications required and the initial salary index used in the public service(1). The average monthly cost by category (including of course all salaries, allowances and charges paid by the employer), is therefore as follows:

. Category A Frs.4,300
. Category B Frs.2,500
. Category C Frs.1,700
. Category D Frs.1,380

- at PARIS I the study was conducted on non-teaching staff belonging to the general services. It covered 335 people, established and non-established and remunerated either from the national budget or from the university budget. The figures obtained were appreciably lower than the results recorded at PARIS X for categories A and B.

Average monthly cost of non-teaching general service staff - University of Paris I:

. Category A Frs.2,900
. Category B Frs.1,800
. Category C Frs.1,700
. Category D Frs.1,380

1) For the reclassification procedure please consult "Method of calculating ....." op.cit., and the report by Paris X Nanterre published in "Calcul des coûts ....." op.cit.

These results tally and seem to confirm the conclusion reached by the University of Toulouse le Mirail to which we have referred. As universities are now autonomous their personnel have additional management functions. The personnel is probably under-qualified and under-remunerated in view of the new type of management functions which should prevail in autonomous universities. We fell that university management can only be improved by the adoption of a different policy in respect of the qualifications, staffing ratios and remuneration of administrative, technical, manual and service personnel.

III. OPERATING COSTS

The problems the different research teams had to deal with in connection with operating costs were very different from those they encountered with regard to staff costs and capital costs. Unlike the latter, operating costs involved practically no problems of identification and evaluation. The clearest evidence of the autonomy the universities were recently granted is to be found in their operating budgets. This should therefore be the most accurately charted sector presenting the fewest difficulties. It will readily be seen from the reports submitted by the various research teams that a considerable volume of arduous work had to be done by each of the universities in this field. This was primarily because there is no equation between a university's operating costs and its budget for two reasons:

- the first is that there is no reason to take account of any sums already estimated in respect of staff costs or capital expenditure. Accordingly, expenditure on administrative, technical, manual and service staff and the cost of any teaching staff paid from the university budget had to be separated from the budget (this expenditure is shown under staff costs). Similarly, accounts No. 68 (provision for depreciation) and No. 69 (other budget expenditure) will not be taken into consideration.

- the second reason is connected with the frame of reference used, i.e. the budget year does not correspond to the university year. Two solutions were theoretically possible. Either the budget year could be chosen and the student population adjusted using student registration figures or two university years or the university year could be chosen and the commitments calculated for that period. The latter solution was ultimately adopted but the need to reconstitute the expenditure for the university year entailed additional work.

However, the main difficulties arise not from these problems of identification but from the problems of assigning all these charges to the elementary units of activity (U.E.A.s). It should be said at the outset (for this problem will arise again in connection with the calculation of activity costs) that all the teams (except perhaps Toulouse-Sabatier whose internal management would appear to be extremely efficient) had a hard task finding the least ineffective way of assigning the operating costs to the various UEAs. In certain cases systems already existed for breaking down certain charges but in most cases the missing information had to be reconstituted by resorting provisionally to more or less arbitrary criteria. The various university reports contain information on the procedure adopted but there would be no point in presenting them here. Any attempt to work out an overall presentation would be useless owing to differences in structure and organisation.

It was in fact clear that the interrelations between the various university services were very far from being systematically identified. The study has revealed this deficiency and a start has been made to seek remedies in a number of fields. But this is a long-term task and it will probably be necessary to concentrate in the short-term on devising a system of data collection. It is in fact absolutely essential that management data and particularly interrelations between elementary units of activity should now be recorded on a systematic basis. This need will be clear from part two of the present paper.

PART TWO

FROM ACTIVITY ANALYSIS TO OUTPUT COSTS

The approach adopted by the group of French universities breaks down the output process into two phases:

1. Consumption of inputs for the exercise of an activity contributing directly or indirectly to output.

2. Combination of activities for a given output.

This type of analysis is therefore based on an exhaustive study of structures: its scope naturally includes supporting and administrative activities and the production of intermediate outputs; it thus permits fruitful thinking on university organisation, and cost formation and control; lastly, a detailed knowledge of the output processes at a given point in time paves the way for decision-making analyses.

Not all universities have been able to achieve the same type of results, for at the time when the study was started some of them had very little statistical information on their own functioning (notably Paris I), whereas others, for a wide range of reasons, were in a much better position. The work done jointly, the exchange of experience and the various contacts contributed to an increase in "self-knowledge" in all universities; perhaps we should emphasize here the full significance of this joint thinking before presenting the results obtained in each university.

IV. ACTIVITY COSTS

Analysis of the structure of activity and a desire for a detailed knowledge of the production processes led to the definition of the basic unit of the system, the "elementary unit of activity" (U.E.A.)(1), and then to a classification of all U.E.A.s as follows:

- directly productive U.E.A.s:
  - Teaching U.E.A.s (U.E.A.E.s)
  - Research U.E.A.s (U.E.A.R.s)
- indirectly productive U.E.A.s
  - U.E.A.s providing services (U.E.A.P.S.s) defined by the fact that their output is measurable and effectively measured.
  - Administrative U.E.A.s (U.E.A.A.s)

The first stage will be to calculate globally the complete cost of each U.E.A. (from this will be deduced unit costs of activity for U.E.A.s having an activity index). On completion of this work the total costs will be found in the accounts of the directly productive U.E.A.s determining their complete cost; it will then be possible to calculate unit costs of training by level of studies, cycles and type of training. It is of course at this level that a comparison of the results obtained by each university is interesting, but the preceding operations are very important because they throw light on the internal functioning of each university.

IV. 1 COST OF ELEMENTARY UNITS OF ACTIVITY

It should be noted that the degree of certainty with which input consumption by each U.E.A. is known is variable: for this reason three categories of costs must be distinguished:

- direct cost defined as the total charges assigned directly to the U.E.A. in question
- semi-direct cost: total charges apportioned to a U.E.A. after passing through another U.E.A. (services) as a result of consumption of the outputs of the second by the first, this consumption being known perfectly in physical terms.
- indirect cost: total charges apportioned to a U.E.A. after passing through another U.E.A. as a result of consumption of outputs of the second by the first, this consumption being merely estimated by an apportionment criteria (as it concerns a non-measurable output).

The procedure for calculating the global costs of U.E.A.s will therefore comprise three stages:

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1) let us recall its definition: "utilisation of the smallest set of resources co-ordinated in a process designed to produce a final or intermediate output or service (or several final or intermediate outputs or services)". See "Method of calculating costs"... op.cit.

- First stage: assignment of direct costs to U.E.A.s. The university's total costs as defined above must be fully assigned to all U.E.A.s(1). In principle there should be no difficulty (it is known where the various activities are located and it should be easy to find the necessary data). In fact, numerous difficulties arose: very often there had been no systematic recording of data on timetables and classrooms; even for administrative activities the assignment of direct costs gave rise to problems; for example, it is known that the breakdown of the operating budget is not precise enough in the existing accounting system, and the various universities therefore had to assign charges according to their nature on the basis of a detailed analysis of the real operation of each institution.

In addition, on the basis of the working hypothesis adopted provisionally by the universities concerned regarding the teacher-time budget, the cost of permanent teaching staff was broken down as follows: 50 per cent to teaching U.E.A.s (U.E.A.E.s), 50 per cent to research U.E.A.s (U.E.A.R.s) and 0 per cent to administrative U.E.A.s. On the other hand, the cost of temporary outside staff was of course charged entirely to the U.E.A.E.s concerned. This direct cost of U.E.A.s is therefore substantially dependent on the assumptions made with regard to the time budget and there is no doubt that this underestimates the real cost of administration in the universities.

Remaining at this level for the moment, it appears that a number of summary but useful management indicators can be calculated; there are a number of U.E.A.s for which activity indicators can be identified without too much difficulty. It is then possible to move from the global cost of a U.E.A. to a much more significant unit cost:

- for teaching U.E.A.s, the most interesting activity indicators are firstly, the number of students enrolled in the U.E.A.E. and secondly, the number of contact-hours characterising that U.E.A.E. To take an illustration, the Dijon report contains a calculation on the second year of the "Licence en Droit" (law degree): this shows that, according to the subject, the direct cost per student (total direct cost/student enrolments) varies from Frs.44 to Frs.280, whereas the direct cost per contact-hour (total direct cost/number of contact hours) varies from Frs.0.95 to Frs.6.40, the average direct cost per contact hour being Frs.1.75; these are undoubtedly indicators that can be used by the university management.

- for service U.E.A.s characterised by the fact that their activity is measurable in physical terms and that accounts of their services can be kept(2), it is possible to define activity indices the cost of which can be calculated: cost of reproducing a page, running a programme, photocopying a page, holding a session in the language laboratory or binding a book. Examples of this type of work will be found in the reports of Paris IX Dauphine and of Toulouse le Mirail; (in the latter case the study led to the reorganisation of the book binding shop whose cost price had proved extremely high).

But this was only a first stage; the greatest difficulties encountered by the research teams arose later.

- Second stage: semi-direct apportionment: The cost assigned to the U.E.A.s providing measured services is apportioned among the U.E.A.s receiving their output, in proportion to consumption. The direct unit cost of the activity index defined above (and taking account of reciprocal inter-U.E.A.P.S. services) makes it possible to evaluate the consumptions of recipient U.E.A.s and to work out the semi-direct cost of

1) Except certain costs directly concerning students (student aid) and therefore directly linked to an output without reference to the concept of activity.

2) In many cases it was necessary to reconstitute them.

the latter. Even for this relatively simple operation certain minimum conditions must be fulfilled and some teams were very heavily handicapped in their work by the failure to achieve that minimum. For example, the Paris I report says: "as no system of data registration existed in 1971-72, the activity index concept was of very little use". While the work done may not have provided complete results on costs, it will at least have convinced the administrative authorities of the gaps in the information and lead to a definite improvement in data collection.

- Third stage: indirect apportionment: The semi-direct cost of administrative U.E.A.s is apportioned among the recipient U.E.A.s on the basis of apportionment criteria for estimating non-measurable consumptions. As it is normally difficult to link the general service U.E.A.s to the directly productive U.E.A.s a two-stage treatment was preferred in almost all universities:

- apportionment of general service costs among U.E.R.s
- apportionment of administrative service costs of U.E.R.s (including of course the proportion of the general service costs assigned to them) among their directly productive constituent U.E.A.s

In fact the universities had to take account of specific features of management structure in solving these problems. Two interesting extreme cases occur: at Grenoble II the U.E.R.s play a very important role in management and have relatively substantial resources(1); at the other extreme is Toulouse Sabatier with a strongly centralised management, which leads to somewhat different treatment, indirect apportionment being made directly to the directly productive U.E.A.s and to some extent bypassing the stage of general service cost apportionment among U.E.R.s. The proposed approach therefore has the advantage of very great flexibility of application.

It is obvious, incidentally, that no systematic presentation of the work done in the various universities is possible here; in each case, it was necessary to develop criteria for apportioning the costs of the U.E.A.A.s to the directly productive U.E.A.s while taking account of structural peculiarities and after a detailed analysis of the functioning of the institution. The development of this subject in the various reports is explicit enough for it to be unnecessary to revert to it here, but the work of two universities is of sufficiently general interest to warrant slightly longer consideration:

Paris IX Dauphine carried out a study on inter-service exchanges which led to the elaboration of a matrix of inter-service coefficients which is reproduced in the university's report(2): in this matrix the intersection of row (i) and column (j) gives the percentage utilisation of service (i) by service (j). Reciprocal services have been disregarded owing to the lack of adequate information. This explains why the matrix is triangular and does not require inversion; in addition it was possible to synthesise these data on a graph associated with the matrix, which is also reproduced in the report. At the same time, it was possible to quantify additional indicators: for instance, the unit cost of student enrolment (per credit) or the cost of teacher management (per teacher hour). This operation was facilitated apparently by the fact that reciprocal services had been disregarded and secondly because enrolments at this university are relatively limited.

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1) The Grenoble II report provides interesting indications on the resources available to each U.E.R.

2) cc. report Paris IX Dauphine in "Calculs des coûts..." op.cit.

- Paris X Nanterre was more ambitious; it is a much larger institution and made an effort to take account of reciprocal services among all administrative U.E.A.s(1). A number of criteria or estimates had led to a first estimate and the assignment of a number of charges but an in-depth study of interrelationships between all administrative U.E.A.s involved numerous interviews with heads of services in order to remove ambiguities and make a number of adjustments. To facilitate calculations and presentation, the services were arranged in major functional groups, which resulted in a 6 x 6 matrix in which all interrelationships were represented; this matrix had of course to be inverted in order to obtain the indirect global cost of each of these services and apportion these charges among the recipients (mainly the U.E.R.s). The very cumbersome method does not seem for the moment to be capable of simplification, but at this stage of the work it produced a better analysis of internal relationships within the institution; at the same time the various heads of service were more closely associated with the study and made aware of the problem of management and cost determination; lastly, this operation made it possible to explore a difficult problem fundamental to a knowledge of costs.

Only after this work, i.e. at the end of the third stage, are all costs to be found in the accounts of the directly productive U.E.A.s and the complete cost of the latter is established. Note that for the moment the problem of research has been reserved and that priority is given to calculating the costs of the teaching U.E.A.s(2). Such calculations may already be useful to each university; of course, there are sometimes very large divergences in the costs(3); some are naturally due to the number of students or contact hours (which leads to more refined comparisons involving costs per student or per contact hour) but other explanatory variables must be taken into consideration.

In any case it is obvious that the search for laws of variation in U.E.A. costs could not be carried out in the context of this study(4). The preceding calculations made it possible to compile the basic information essential for this purpose. The evaluations also give the university authorities indications on the assignment of resources to the various elementary activities. Lastly, on the basis of the costs of elementary units of production, it is now very simple to evaluate the cost of a particular type of training.

IV. 2 COST OF NON-ELEMENTARY UNITS OF ACTIVITY

It is particularly interesting to define and calculate costs not at the level of elementary units, but for certain subsets defined with the aid of a regrouping criterion: in this way a particular university can try to evaluate the global cost of a first cycle of language teaching or a third year of economic science. This is now easy: it is merely necessary to regroup the costs of the elementary units of teaching, which are known and take account, after the operations described above, of indirect, semi-direct and of course, direct costs. Available data (cf. the attached tables) make it possible to initiate a rough comparison of the cost level and the cost structure.

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1) cf. report Paris X Nanterre in "Calcul des Coûts..." op.cit.
2) Examples will be found in each of the preceding reports.
3) cf. the cases mentioned by Paris IX Dijon Toulouse Sabatier.
4) cf. "Method of calculating..." (op.cit. Ch. 12).

IV. 2.1 EVALUATION OF COST PER STUDENT YEAR

If the first type of comparison is to be meaningful, it is of course necessary to reason from unit costs, i.e. to proceed from the total cost to the cost per student. Insofar as we are trying here to calculate an activity cost and not an output cost the denominator cannot take account of students who have graduated (or passed their examination) but of the numbers engaged in the training activity i.e. the number of persons who have benefitted from a certain allocation of resources by the university. No general reply could be given to the more specific question whether account should be taken of the students administratively or pedagogically registered for the examination; among the statistics available, the universities decided to use the number nearest to reality. This is a further reason for interpreting the tables set out below with some caution.

These figures also reflect a number of assumptions which should be borne in mind: for instance, the assumption regarding the teacher-time budget which, as we saw, led to the allocation of 50 per cent of the cost of teachers to teaching (50 per cent to research, 0 per cent to administration). Another important working assumption, as regards capital costs, is to argue from the depreciation standpoint adopting the concept of accounting costs in preference to opportunity costs and thus disregarding the financial charge represented by fixed capital(1). It should be noted that these evaluations are far from exhaustive; firstly, because in view of the length of the study, it was not possible to take account of direct aid to students; secondly, because the charges deriving from regional and ministerial management have not been integrated since it is the university which was chosen as the frame of reference(2).

The first thing we notice is the size of the disparities; in the figures now available for 1971-72 the difference ranges practically from 1 to 7: Frs.802 per student for the DES year at Grenoble II against Frs.5,346 per student for the 3rd year in management at Paris IX Dauphine (probably the 4th year at Dauphine would give a higher figure). It should be noted, however, that the distribution is not homogeneous: the median stands at Frs.1,617 and the average at Frs.2,051. These figures, which relate only to courses in arts, law and economics (and some management, usually more costly), should be compared, with all possible caution (in view of the small number of observations and the different techniques used) with those obtained for the scientific disciplines at Toulouse Sabatier(3).

The extent of the deviations cannot be fully explained at this stage. Pedagogical differences certainly play an important role: in the lowest evaluations we find, for instance, the economics and law DES at Grenoble II (Frs.802 and Frs.1,112 respectively), probably because the number of contact hours there is relatively low, with more scope for individual work by the student. There is probably a similar explanation for the relatively low cost of the final year ("maîtrise") in some arts subjects(4).

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1) A sensitivity analysis was attempted at Paris X Nanterre and is described below, p

2) Moreover in 1971-72 the library budget was not integrated in the university budget, and the treatment of libraries has therefore been reserved, which leads to underestimates.

3) It would be interesting to compare these figures with other evaluations (Grandes Ecoles, foreign universities).

4) We may mention in passing that reforms of the 1st and 2nd cycles will in many cases lead to heavier arts timetables and to an increase in the average cost per student year and in the overall charges for the university. Calculating the cost of a reform ought to be an obvious necessity....

The number of students is of course a variable which must be taken into consideration. For instance, at Dijon the unit costs obtained for economics are always higher than those for law; this is mainly due to the smaller enrolments in the former, since teaching in the two is very comparable. At Dijon, too, unit costs increase with the cycles: the smaller enrolments and the many options offered to students combine to explain this phenomenon. At Paris X Nanterre a similar phenomenon may be observed, but less clearly: among other reasons, the number of students in the 2nd cycle is very high there and economies of scale (varying according to the options) therefore come into play, so that the average cost is much lower than at Dijon. On the other hand, in the 1st cycle of economics at Paris X Nanterre economies of scale have less effect than was expected since, for obvious pedagogical reasons, the size of classes is limited, there is a wide range of choice, and staffing ratios are strengthened.

Lastly, among the five evaluations exceeding Frs.3,000 there are three management courses: the 3rd year management course at Paris IX rising to Frs.5,346 (no detailed information on the 4th year); the disparity should be mainly due to the working methods (small group teaching, use of relatively costly techniques).

Of course these few comments are merely illustrative: the above table would have to be amplified in order to permit comparisons between disciplines and between universities; in addition, far more elaborate treatment is needed if we wish to determine the cost variation laws. At any rate, we feel that this type of information should be useful both at the level of the internal management of each university and at a higher level of decision-making. In this connection we would stress the importance of the Dijon and Toulouse Sabatier studies(1); these institutions have had an adequate data recording system for a fairly long time and provide estimates covering several years or several student generations.

IV. 2.2 COST STRUCTURE

Cost structure obviously varies considerably within the same university according to the U.E.A.s considered; for teaching U.E.A.s it differs greatly according to the cycles of study, levels of training, category of staff providing the teaching etc... Without going into too much detail we may make a few remarks on the average cost structure of teaching U.E.A.s:

- costs of teaching staff play a predominant role and alone account for 50 per cent of the cost on average. In the sample studied they never fall below 48 per cent economics (Paris X Nanterre, Dijon), management (Paris IX Dauphine) - and they represent, according to the years, 54.7 per cent to 64.7 per cent at the science University of Toulouse Sabatier(2). In this last case the costs are those of the staff contributing to teaching: teaching staff proper, but also technical personnel working in laboratories and taking part in the preparation of practical instruction (this second category is of very great numerical, and therefore budgetary, importance in scientific universities). We should of course add (a) that this importance naturally varies according to the U.E.A.s and (b) that it is largely dependent on the working assumption regarding the teacher-time budget adopted for all universities.

- the relative proportion of capital costs appears much less and even seems surprisingly small: around 8 per cent. The figure is extraordinarily small at Toulouse le Mirail (under 3 per cent) and larger at Toulouse Sabatier, the only science university in the group (7.7 to 9.8 per cent according to the years). Of course this relative figure would be considerably greater if an interest rate had been applied to fixed capital.

1) The latter study will be described at greater length in the next chapter.
2) cf. Toulouse Sabatier report in "Calcul des Coûts..." op.cit.

- the proportion of costs assignable to other types of charges is therefore considerable on average (about 30 to 40 per cent); a finer analysis of the structure of these costs is therefore desirable. On this point, interesting indications are provided by Toulouse Sabatier. For the period 1966-67 to 1971-72 the global cost structure is within the following limits:

	minimum	maximum
Cost of personnel contributing to teaching	57.4%	64.7%
Capital cost	7.7%	9.8%
Teaching grants	6.9%	15.1%(a)
General operating cost	13.4%	15.4%
Cost of administrative, manual and service personnel	5.4%	8.3%

(a) Note a very definite downward trend since 1967-68, both in relative and absolute terms.

Here, too, the variations from one U.E.A. to another may be very great. We can thus see more clearly how very important it is to have a detailed knowledge of the workings of the institution: only then can we carry out correctly the successive operations of semi-direct and direct apportionment; and a good knowledge of retrospective costs is the essential prerequisite for any attempt to rationalise university management.

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We have shown how far the evaluations provided were dependent on the assumptions made on a number of points. No doubt it would have been preferable in each case to give not just a single figure, but a series of figures, by altering one or more assumptions. Among other advantages this would have permitted a sensitivity analysis. In view of the deadline for the study and the difficulties of collecting information, it has not been possible to go as far as this(1). In any case the aim was essentially to test and improve the new methodology developed in the first phase of the work, and the figures given are merely illustrative. It is clear that the unsophisticated nature of data collection in most of the universities was a considerable handicap in the work; it is not by chance that the largest volume of data was provided by the Universities of Dijon and Toulouse Sabatier with their very superior experience of data collection and processing over several years. A more detailed knowledge of costs and a study on the cost variation laws would enable each university to have a clearer picture of what it has done and is planning to do; this is possible only if it sets up a data collection and information processing system meeting these requirements. The study described here provided an opportunity for definite improvements and there is no doubt that these efforts should be continued and strengthened.

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1) An exploratory study on this subject was made at Paris X Nanterre: the results are given below, p. 59.

EVALUATION OF TOTAL UNIT COST PER STUDENT YEAR (in current Francs)

by type of training
levels of training
universities

Year 1971-72
(except where otherwise stated)

Type of training	Level of training	UNIVERSITY						
		Paris IX Dauphine	Paris X Nanterre	Grenoble II	1970-71	Dijon 1971-72	1972-73	
ECONOMICS	1st year		1389	1530	1887	1614	1975	(a) According to the options, there is a disparity which is at its maximum in the 4th year when the most expensive option is 45 per cent dearer than the least expensive
	2nd year		1517	1645	1892	1818	1910	
	3rd year		1863(a) (1802 to 2190)	1392	2189	2653	2423	
	4th year		1796(a) (1661 to 2078)	1547	3462	4447	4312	
	DES			802				
MANAGEMENT	3rd year	5346		3250(b)				(b) I.E.C. Grenoble (c) I.A.E. Grenoble (d) As every student must register for two certificates, the cost per student is therefore variable according to certificates (from 950 to 4090 for one certificate)
	4th year	(d)		2154(b)				
	5th year			4523(c)				
LAW	1st year			1316	1234	1445	1513	
	2nd year			1617	1314	1414	1651	
	3rd year			2596	1521	1833	1731	
	4th year			2224	1975	1795	2458	
	DES			1112				

Type of training	Level of training	UNIVERSITIES						
		Paris IX Dauphine	Paris X Nanterre	Grenoble II	1970-71	Dijon 1971-72	1972-73	Toulouse Sabatier
HISTORY	1st cycle			2423				
	3rd year			2844				
	4th year			1000				
PHILOSOPHY	1st year			1448				
	2nd year			3970				
	3rd year			2069				
	4th year			1466				
PSYCHOLOGY	1st year			1064				
	2nd year			1560				
	3rd year			1195				
	4th year			1163				

Scientific disciplines (mathematics, physics-chemistry, chemistry-biology, biology-geology)(e)

Note (e): very detailed information is given in the Toulouse Sabatier report but the very elaborate technique used does not provide directly comparable results

Average cost per first year student (in Francs 1972) (average of all above disciplines)

G1 (student intake in Oct. 1966).....2980
G2 " " " " 1967.....3014
G3 " " " " 1968.....1976
G4 " " " " 1969.....3447

V. OUTPUT COSTS

The evaluation of activity costs makes it possible to move on to the calculation of output costs. We must, however, first agree on the concept of output used and have a knowledge of the breakdown of students among the various teaching U.E.A.s(1).

V.1 IDENTIFICATION AND CLASSIFICATION OF UNIVERSITY OUTPUTS

We can only envisage calculating output costs if these can be described, listed and counted. In the present state of knowledge, these conditions limit the study of final outputs to the outputs of teaching proper (excluding research outputs which would require other investigations), i.e. students who have taken part in one or more teaching activities, subject to testing or not.

Using the criterion adopted to define the scope of the study, i.e. the higher educational institution, two main categories of outputs could be distinguished:

1. Final outputs of teaching: students who have decided to leave the institution or who have obtained a degree (or attestation) enabling them to leave the instituion with a qualification recognised as higher than the one they had on entering. These include:

   a) graduates leaving the institution permanently or remaining in order to obtain a higher degree or diploma.
   b) non-graduates leaving the institution either because they are giving up their studies (temporarily or permanently) after partial success or failure, or because they decide to continue their studies in another institution (transfers)(2).

2. Intermediate outputs of teaching: students who have not obtained a degree and have decided to remain in the institution. These include(3):

   - students in process of training
   - repeaters

Outputs thus being defined, it is possible to make the transition from activity costs to output costs, provided information is available on student flows.

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1) cf. here "method of calculating....." op.cit. Ch. 8 and 9

2) Note that if the field of study selected were the educational system as a whole (and not the institution) this last case would come into the category of intermediate outputs.

3) Note too that it is possible accessorily to define a third category, outputs awaiting assignment: it covers students who have not obtained a degree and who have not yet - at the time of the study - taken the decisions to continue in the institution or to leave it.

V.2 ANALYSIS OF STUDENT FLOWS

This analysis was effected from two different standpoints:

V.2.1 CROSS-SECTION ANALYSIS: breakdown of the student flows in a given year among the various U.E.A.E.s of a U.E.R. or among the U.E.R.s or even among the U.E.A.E.s of the various U.E.R.s in the university.

The data to be obtained (and therefore the difficulties of calculation) are extremely variable, the simplest case occurring when two conditions are simultaneously fulfilled:

(a) the degree has a year structure

(b) all courses for the degree in question are given by the same U.E.R.

In this case the student's choices remain within the U.E.R. and it is possible to identify the students without any great difficulty.

This case was a frequent occurrence in 1971-72 in a number of disciplines (e.g. courses in law, economics and management at Dijon, Grenoble II, Paris IX-Dauphine, Paris X-Nanterre).

In each of these cases student choices were reconstituted, but the analysis of flows becomes much more complex when neither of the above two conditions applies. The problem already existed in 1971-72, in particular for courses such as arts, languages and human sciences, but the phenomenon is becoming more general owing to the broader range of choice available to the students and the development of pluridisciplinarity. The whole university then has to be searched for student "choices". This can be done(1) by drawing up a rectangular table with the rows showing the students reading for a given degree(2) and the columns the U.E.R. receiving them.

Work of this type was done at Paris X-Nanterre and Toulouse le Mirail. In this last case - presented here as an illustration(3) - the breakdown of the choice made by students in the U.E.R.s of the university was obtained for each dominant, i.e. for each degree offered by the university.

The results obtained show for each U.E.R. the services provided for the preparation of each degree. We see (cf. attached table) that there are "open" U.E.R.s like geography which devotes over 50 per cent of its teaching to students reading for other degrees. At the other extreme there are "closed" U.E.R.s like psychology which devotes 95 per cent of its teaching to students reading for the psychology "licence". Lastly, there are disciplines which are essentially subsidiary subjects. e.g. Portuguese which is mainly taken (nearly 90 per cent) by students studying for other degrees than the Portuguese "licence".

This type of analysis gives a clearer idea of the resources effectively used for each university activity programme: preparation of a D.U.E.L., a D.E.U.G., or a licence... It is also possible to distinguish the cost associated with the teaching of a U.E.R. or the cost associated with the preparation of a degree.

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1) The method of treatment is described in detail in "methods of calculating..." (op.cit. Ch.9).

2) Sometimes the term "dominant" or "channel" is preferred.

3) See report of Toulouse le Mirail in "Calcul descoûts..." op.cit.

UNIVERSITY OF TOULOUSE LE MIRAIL

PERCENTAGE BREAKDOWN OF ENROLMENTS FOR CREDIT IN 1971-72

(REAL ENROLMENTS)

"Dominant" U.E.R. or host Department	PHILOSOPHY	PSYCHOLOGY	EDUCATIONAL SCIENCE	SOCIOLOGY	CLASSICAL LITERATURE	MODERN LITERATURE	HISTORY	HISTORY OF ART	GEOGRAPHY	GERMAN	ENGLISH	SPANISH	ITALIAN	PORTUGUESE	RUSSIAN	LINGUISTICS	MANAGEMENT
PHILOSOPHY	84.58	5.17	0.06	0.18	1.98	2.46	0.54	0.60	0.06	0.06	3.67	0.54	-	-	-	0.06	-
PSYCHOLOGY	1.72	95.67	0.80	0.50	0.05	0.30	0.05	-	0.02	-	0.65	0.12	-	-	-	0.10	-
DIPL. PSYCH.		34.54	64.24			1.21											
EDUCATIONAL SCIENCES	2.48	10.95	70.20	0.42	0.94	5.56	2.14	-	0.94	0.84	2.91	2.56	-	-	-	-	
E.P.S.	0.39	16.76	0.39	0.59	0.98	14.14	6.11	2.16	6.31	9.27	26.03	10.45	1.38	0.19	0.39	-	.19
TOTAL PSYCH.	1.73	70.13	16.44	0.47	0.30	2.92	0.99	0.18	0.75	0.97	3.28	1.50	0.11	0.01	0.03	0.06	0.01
SOCIOLOGY	6.43	20.53	-	58.71	0.14	1.51	6.07	0.36	1.80	0.36	3.32	0.72	-	-	-	-	-
CLASSICAL LITERATURE	6.32	0.42	-	-	53.11	31.34	0.93	0.09	-	0.58	1.93	3.29	1.26	0.32	-	0.16	-
MODERN LITERATURE	0.71	1	0.09	0.02	9.43	50.01	0.39	0.18	0.07	3.92	19.08	13.54	0.69	0.15	0.34	0.25	0.04
HISTORY	0.58	0.33	0.01	0.33	0.66	2.22	73.92	4.87	11.23	0.40	3.99	1.29	0.03	0.06	0.03	-	0.01
HISTORY OF ART	3.06	3.34	-	0.39	4.51	18.18	18.29	40.54	1.45	1.17	7.02	1.28	0.44	-	0.27	-	-
TOTAL HISTORY	1.11	0.93	0.01	0.34	1.47	5.60	62.13	12.43	9.16	0.56	4.63	1.28	0.11	0.04	0.08	-	0.01
GEOGRAPHY	0.13	0.44	-	0.17	0.03	0.48	40.41	0.82	53.53	0.17	1.95	1.75	0.03	-	-	-	0.03
LANGUAGES AND LINGUISTICS																	
GERMAN	1.12	0.17	-	-	0.23	5.82	0.11	0.05	-	80.67	11.20	0.17	-	-	0.32	0.05	-
ENGLISH	1.91	0.59	0.01	0.02	0.45	9.67	0.11	0.07	0.10	1.80	81.34	3.05	0.17	0.12	0.45	0.02	0.05
SPANISH	1.69	0.66	0.03	0.06	0.19	10.28	0.25	0.06	0.10	0.46	17.30	64.40	0.08	0.25	0.12	0.01	0.01
ITALIAN	1.98	1.72	-	-	1.19	11.52	4.80	2.38	0.26	5.16	13.50	8.87	43.31	-	0.13	0.13	-
PORTUGUESE	2.88	0.44	-	0.22	-	5.55	1.33	0.11	0.44	0.55	6.44	69	0.55	12.33	0.11	-	-
SLAV LANGUAGES	1.23	0.92	-	-	2	6.18	2.47	0.77	0.61	8.19	16.07	3.24	0.77	0.30	56.25	-	0.92
OTHER LANGUAGES	3.70	10.18	-	0.46	4.62	15.27	25.92	2.77	6.48	3.24	8.33	13.42	2.31	-	3.24	-	-
LINGUISTICS	0.34	7.41	0.86	0.17	1.20	24.48	0.34	-	-	11.37	21.20	4.31	-	2.58	2.24	23.44	-
TOTAL LANGUAGES	1.75	0.79	0.03	0.04	0.42	9.61	0.67	0.16	0.16	10.44	45.91	26.11	1.22	0.55	1.55	0.46	0.04
ECONOMICS	5.26	16.98	-	36.36	-	1.43	8.37	-	16.50	0.71	7.41	1.43	-	-	-	-	5.50
MANAGEMENT	2.33	20.46	-	3.50	-	2.92	9.94	-	0.58	2.33	15.20	6.43	-	-	-	-	36.25
TOTAL ECON.& MAN.	4.41	17.99	-	26.82	-	1.86	8.82	-	11.88	1.18	9.67	2.88	-	-	-	-	14.43
Dt. MATHS.	2.58	6.97	0.25	25.06	-	3.87	8.26	0.25	27.64	1.29	5.68	6.71	0.25	0.51	0.25	3.61	6.71
GRAND TOTAL	4	7.98	1.55	1.88	4.32	13.88	11	1.85	4.18	5.79	26.11	15.05	0.77	0.31	0.81	0.29	0.21

From similar work carried out at Paris X-Nanterre we observe that for purposes of cost evaluation it is necessary, for each U.E.A.E., to keep a card(1) showing student enrolled in a U.E.A.E. of English are taking this class as part of an economics course, then 80 per cent of the cost of this U.E.A.E. must be assigned to the training of economists and not of English graduates. In the case of university courses with a strongly pluridisciplinary character, it is necessary, in order to calculate output costs, to have detailed information for each U.E.A.E. on the origin of the students who have received this instruction. These data were drawn up at Paris X-Nanterre for the year 1971-72 for all U.E.R.s specialising in literature, languages, human sciences and economics, but the transition to output costs requires a time-series analysis of flows as well as cross-sectional data on the breakdown of student enrolments.

V.2.2 TIME-SERIES ANALYSIS (intake analysis)

The aim is to study the flow of students from one year to the other, along a path leading either to graduation, drop-out or departure. If we know on the one hand the teaching activities in which the student has participated and his successes and failures and on the other hand the unit cost of each U.E.A.E., it is then possible to obtain the cost of each student, whether he is in process of training or at the end of it.

Unfortunately, owing to the recent creation of many universities and the general inadequacy of data collection and processing, very few universities possess historical data (Dijon, Toulouse le Mirail and Toulouse Sabatier); in a number of cases it has been possible to reconstitute some data in a very rudimentary manner. But it is obvious that in this field results are perforce limited.

Yet the work done at Toulouse Sabatier shows how useful this type of analysis can be: and it was only possible because the administrators responsible for the Faculty of Science had kept records for each student since 1966, showing all enrolments and all results each year. In these circumstances it was possible to observe four generations of students(2) who entered the first year of the first cycle for the first time in October 1966, October 1967, October 1968 and October 1969(2). The flow of these generations was studied up to the year 1971-72(3).

This study which is the essential preliminary to calculating output costs gave rise to conclusions of sufficient importance to warrant their inclusion here:

1. Few students obtain the success they certainly hoped for when they enrolled in higher education.

2. The "predominant level" of failure is located in the first year of the first cycle.

3. This factual situation definitely deteriorated from the first to the fourth generation.

33 per cent of the students enrolling for the first time in 1966-67 left the institution at the level of 1st year, 1st cycle, after failure.

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1) A sample card is reproduced in the report of Paris X-Nanterre in "Calcul descoûts..."; and shows students attached to eleven different channels following the same U.E.A.E. We can see that too global a treatment can only lead to hasty evaluations.

2) Designated respectively as G1, G2, G3, G4.

3) The generations entering in 1970, 1971 and 1972 were disregarded as the time series would have been too short for significant conclusions.

47 per cent of the students enrolling for the first time in 1969-70 left the institution at the level of 1st year, 1st cycle, after failure.

4. The results at the level of the Diplôme Universitaire d'Etudes Scientifiques (D.U.E.S.) likewise showed steady deterioration.

54.04 per cent of generation G1 obtained the D.U.E.S; only 32.29 per cent of generation G4 obtained the D.U.E.S.

5. We could find no demographic or socio-occupational explanation to elucidate the causes of the trend observed (Points 3 and 4).

6. The results obtained by women students are different from those obtained by men:

27 per cent of men in generation G4 obtained the D.U.E.S.

43 per cent of women in generation G4 obtained the D.U.E.S.

7. For generation G1: 14.62 per cent of those enrolled obtained the "maîtrise" in 4 years; for generation G2: 11.84 per cent of the generation obtained the "maîtrise" in 4 years; for generation G3: 8.31 per cent of the generation obtained the "maîtrise" in 4 years.

These figures should, however, be adjusted if account is taken of departures at 1st cycle level (1st or 2nd year) after success

i.e. 6.76 per cent for generation G1
6.82 per cent for generation G2
11.71 per cent for gen ration G3.

Accordingly, while the percentage of students obtaining the "maîtrise" in 4 years decreased for generation G3, it should be borne in mind that, at the same time, the percentage of students leaving the institution at 1st cycle level after success increased.

V.3 FIRST EVALUATIONS OF UNIT OUTPUT COSTS

V.3.1 The most elaborate results were also provided by the University of Toulouse Sabatier which, as we have seen, has historical files of relatively long standing. Here we shall merely refer to some representative evaluations of particular importance(1). The study covered the student generations followed for six, five, four and three years respectively, with a breakdown by type of studies and by sex. The results are presented in constant francs (1972 francs).

V.3.1.1 OUTPUT COSTS AT 1ST CYCLE LEVEL

A preliminary observation is necessary. The generation study revealed an important phenomenon: the high percentage of students leaving the institution at 1st year level (after either one, two or three years) without any examination success to show for the time spent in a higher educational institution. These outlays have been evaluated by generation and by training channel: for instance, as regards the average cost of failure at the level of the 1st year. 1st cycle, there is a relative stability for the four generations (average cost of a student leaving the university without passing the 1st year examination was about Frs.4,000).

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1) The detailed results can be found without difficulty in Section III of the Toulouse le Mirail report.

The costs of the "Diplôme Universitaire d'Etudes Scientifiques" (D.U.E.S.) were evaluated in three different ways:

(i) theoretical cost of a two-year university diploma. These are the norms fixed by the course and a number of students fulfilled them(1). Thus, a student in generation G1 graduating in the mathematics and physics section of the D.U.E.S. in 1968 (two-year cycle) cost Frs.4,898 (constant francs). The student in generation G4 who obtained his D.U.E.S. in two years in 1971 cost Frs.6,203 (constant francs). This example gives some idea of the increase in the cost of 1st cycle education from the 1st to the 4th generation.

(ii) maximum assumption: The cost of outlays in respect of each generation is apportioned to that generation - i.e. the cost of failures in both the first and second years of the first cycle. The calculations were made with a breakdown by specialities and by sex for each generation. Considerable disparities emerged: the lowest figure (Frs.8,153) is for women students in generation G2 (entering the university in 1967-68) reading for P.C. (physics-chemistry); the highest figure (Frs.23,854) concerns oddly enough, the same speciality (physics-chemistry) but it refers to men students (not women) in generation G4 (entering the university in 1969-70); the medium is about Frs.13,700(2).

It should be noted that under this assumption the average cost per section varies not only according to the relative scale of the cost of teaching U.E.A.s but also according to success rates and time taken to obtain a diploma. It is for this reason that the transition from activity costs to output costs is absolutely indispensable. A pedagogical method or a course structure which may seem expensive on first analysis (high activity cost) will prove to be inexpensive if the success rate is high. The examples provided in this connection by the Toulouse le Mirail report are particularly instructive.

(iii) minimum assumption: actual D.U.E.S. cost:

We assign to the students who have obtained the D.U.E.S. only the costs concerning them, i.e, we disregard outlays relating to those who have failed, at the level of either the first or the second year of the first cycle. In addition, students who have obtained the D.U.E.S. by equivalence (and who have therefore not followed a normal university career) are the subject of separate treatment, which is not considered here(3). The figures obtained are thus much lower than in the previous case(4). The median is Frs.8,400 and the extremes are evaluated at Frs.6,190 (women students reading for M.P.-mathematics-physics - who entered the university in 1966-67) and Frs.10,133 (women students who entered in 1969-70 and are reading for C.B., B.G. - chemistry-biology, biology-geology).

Here again the average costs specific to these students are obviously dependent on a number of variables, in particular the rate of success and the length of time students stay in each section of the 1st cycle. In addition these figures are only averages which in fact conceal considerable disparities according to whether students have taken two, three, four, five or more years to obtain the diploma: for instance for the D.U.E.S. in CB-BG obtained by women in generation G2 the average cost (Frs.8,717)

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1) The number per generation graduating in two years corresponds to about 50 per cent of the total number of graduates.

2) All these evaluations are in constant Francs.

3) As these students spend most of their time attending another institution, it is logical not to include the outlays concerning them in the costs specific to each section.

4) But which assumption is the better?

does not tell us that the cost ranges from Frs.7,946 for those who took two years to obtain the diploma to Frs.12,267 for those who took three years, Frs.15,279 (four years) and Frs.23,403 (five years and over).

The success and repeating rates generate considerable charges for the universities, which should be analysed in depth.

V.3.2.2 OUTPUT COST AT 2ND CYCLE LEVEL: the evaluations are made on the two extreme assumptions:

(i) Maximum assumption: assigning to the graduates of a generation all outlays relating to that generation, whether they arise from the 1st or the 2nd cycle (considering only the figures for generations G1 and G2 that take account of the "maîtrise" obtained in four, five or six years and which are the only significant ones). The average cost of a "maître ès sciences" is Frs.42,550 for generation G1 and Frs.58,738 for generation G2.

(ii) Minimum assumption: assigning to graduates only the outlays concerning them. Interesting comparisons were made:

- in relation to the time taken to obtain the "maîtrise": the average cost is about Frs.16,700 for generations G1 and G2 when the degree is obtained in four years but the figures are much higher when a longer period is needed: Frs.18,300 to 23,600 for five years, Frs.21,500 to 25,500 as the case may be, for six years,
- in relation to the types of "maîtrise" (e.g. biochemistry, mechanical engineering, technology, mathematics): in this case the interpretation of the results obtained requires great caution in view of the small numbers in certain specialities. Very generally, for a given generation and a given period (e.g. G1 "maîtrise" in four years; G2 "maîtrise" in five years (two years plus three years), etc...) costs vary from 1 to 2.5 according to the "maîtrise" in question.

Example: G1 "maîtrise" in four years. The cheapest costs Frs.10,123 and the dearest Frs.25,697, i.e. a ratio of 1:2.5.

* * * V.3.2 Work was carried out by the University of Paris IX-Dauphine to calculate the cost of obtaining the "maîtrise" in management, the output of the U.E.R. 2nd cycle management. Of course these results are much less elaborate than those from the previous exercise, and must be regarded as exploratory. Two methods were used, a global method and a more refined method. It should be noted that in both the reasoning follows what may conveniently be called the maximum assumption, i.e. charging only to graduates the total outlays not only for successes but also for failures (which implies, as we know, that the cost of "training" non-graduates is nil).

V.3.2.1 In the global method the total cost of one year is divided by the total output (number of graduates) which makes it possible to estimate the cost of obtaining a degree. This method naturally has the advantage of simplicity but if it is to be used satisfactorily, student flows and cost data would have to be stable. As these conditions cannot be regarded as fulfilled, it is necessary to set up a system of identifying student generations. This is in process of being done, but until it can be used, we have to be content with the very approximate estimate provided by the rough method described above, which gives the figures of Frs.[illegible],920 per graduate ("Maîtrise").

V.3.2.2 A more refined method of calculating the cost per graduate is to aggregate the costs of the U.E.A.s in order to discern the costs of obtaining diplomas according to the channels (certificates) selected by students. Of course the same "stability assumption" is present as in the previous method, but one can obtain a less approximate idea of the production process, the 1st year being reserved for common-core subjects (compulsory for all students), and the second year being diversified (certificates).

The cost of the 1st year ("maîtrise") is Frs.6,472 per student. The cost of the 2nd year will be variable according to the certificates chosen: every student has to choose two certificates and the cost of one certificate ranges from Frs.1,171 (finance) to Frs.6,354 (management methods), so that the output cost (per successful student and for the 2nd year alone) was calculated at between Frs.2,524 (marketing plus finance) and Frs.11,721 (management methods plus English).

By simply adding the costs calculated for the 1st and 2nd years, we obtain the cost of the diploma, ranging from Frs.8,596 to Frs.17,793. By comparison with the figure calculated by the global method, we find that the average cost of obtaining the diploma (Frs.8,920) is very close to the minimum cost (Frs.8,596). This is partly due to the fact that more students choose the cheapest certificates or rather that the certificates with the heaviest enrolments are thereby made more economical. Note that here, unlike Toulouse Sabatier, differences in success rates do not seem to be a fundamental explanatory variable: additional information might be obtained from an intake analysis which could only be carried out after completion of the task, now in progress, of establishing a system of identifying student generations.

These figures cannot be compared with the results obtained for the science disciplines at Toulouse le Mirail: the cost calculated by this university for a science "Maîtrise" on a comparable assumption (maximum assumption) is much higher (Frs.42,550 to 58,700 according to the generation) but it should be emphasized that this figure takes account of the costs of the two cycles of study, whereas the evaluations of Paris IX-Dauphine consider only the 2nd cycle. At this stage it is therefore necessary to steer clear of hasty and meaningless comparisons.

****** V.3.3 Lastly, we must present the work done by Paris X-Nanterre on the cost of the "Licence ès Sciences Economiques". The results obtained may be doubly interesting, as, firstly, a special approach was proposed to make up for the absence of historical records of students' careers, and secondly, because of sensitivity analysis was attempted.

V.3.3.1 APPROACH ADOPTED

It was of course impossible to follow the methodology proposed; without historical data on activities, outlays and student careers, an intake analysis could not be undertaken. It had been possible to calculate the complete cost of each teaching U.E.A. in 1971-72, from which a complete cost per student and per year of study was obtained: these results were presented above(1) and we need merely recall that the average complete cost per student ranges from Frs.1,389 to Frs.1,863 according to the year and that there are also quite substantial cost disparities between the 3rd and 4th year options.

In addition it was possible to reconstitute the careers of 424 graduates in 1972 and an evaluation was accordingly made not on the basis of the numbers entering the university (intake analysis) but on the numbers leaving the 2nd cycle

1) supra p. 44-45.

(graduate analysis). For this it was necessary to use simulation method which involves assuming that the amount and structure of costs remained stable in the past and identical with those observed in 1971-72(1), and, secondly, that the same applied to the structure and organisation of teaching.

V.3.3.2 QUANTIFIED RESULTS: for the sake of brevity we shall disregard the calculations on the average cost per graduate according to the 2nd cycle options and shall merely present the evaluations obtained for the average cost per economics graduate; these evaluations were based on a number of assumptions recalled below.

Theoretical cost per graduate: Frs.6,565.

Note 1): assumin no repeats

2): disparities according to 2nd cycle options are slight (maximum 15 per cent).

Minimum assumption: calculation of cost per graduate by charging to graduates in 1972 the outlays chargeable to them alone. In fact two variants were used:

(a) Average cost in the perspective of higher education: starting with biographical information on graduates in 1972 it is possible to take account of repeats; each of these being valued by the corresponding cost of the year of study at Paris X-Nanterre (even if the repeat took place at another university), this represents an additional cost for higher education(2). This gives a figure of Frs.7,170 which means that repeats by graduates raise the output cost only slightly (only 10 per cent increase on the theoretical cost).

(b) Average cost in the perspective of the institution obtained by deducting the cost of the years of study spent in another institution: i.e. a figure of Frs.6,505 (including the cost of repeats in the institution).

Maximum assumption: charging to graduates alone the total outlays devoted to training all students in the channel in question - hence the figure of Frs.10,884.

A comparison of this result with the previous one gives an estimate of the "efficiency of the university machine", which would be about 65 per cent. This means that system losses corresponding to transfers to other institutions and drop-outs before graduation represent about 35 per cent of the total cost of the U.E.R. Economics.

V.3.3.3 SENSITIVITY ANALYSIS: The evaluation of the "theoretical cost" per graduate (Frs.6,565) may be compared with the results that would have been obtained if certain cost categories had been treated differently. In particular, we know that a theoretical time budget was adopted for permanent teaching staff (50 per cent teaching activities, 50 per cent research activities, 0 per cent administrative activities) and that for the capital cost it was decided to take account of depreciation charges but not financial charges. The sensitivity analysis focussed on the following points:

- assumption regarding the treatment of teaching staff: the "theoretical cost" per graduate shifts from Frs.6,565 to:

Frs.7,133 if we include the administrative activities of teachers as shown by the study on the time budget of teachers of economic sciences at Paris X-Nanterre(3).

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1) This bold assumption has the advantage of avoiding the awkward problem of discounting costs.

2) As a first approximation it was assumed that th costs of training were identical in all U.E.R. Economics.

3) cf. indications on this subject above.

Frs.9,650 if we charge 100 per cent of the cost of teaching staff to teaching activities.

- assumption regarding the treatment of capital assets (buildings, furniture and equipment): the "theoretical cost" shifts from Frs.6,565 to:

Frs.6,052 if it is decided to take account of depreciation

Frs.8,994 if we take account of both depreciation and the corresponding financial charge according to the method of constant annual instalments using an interest rate of 10 per cent.

Assignment of indirect administrative costs: if these were assigned in proportion to student enrolments in the university - a quicker and rougher method than the one used, the result would have been Frs.7,385. Once again we see the need for an in-depth analysis of the internal operation of the university institution(1).

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x x

These are the first results for output costs. It will be seen that even for teaching outputs (the only ones taken into account in this phase of the work) there is no simple answer - and there cannot be one - in view of the difficulties that emerge at each step; in order to have elements of comparison on output cost in this channel in a particular cycle or a particular university, working assumptions must first be carefully defined. Once these methodological precautions have been taken, it is also necessary to have access to an information system - which was usually lacking in most of the universities at the outset of the study. If the study has contributed to the establishment of such systems, this is a positive result in itself. For it is absolutely essential to have a large body of reliable and accurate statistical data so that informed decisions may be taken at all levels.

Of course the field of investigation should be widened: a knowledge of the output cost is necessary, but the quality of outputs and the outlets which they are likely to find should also be taken into account. All these are heavy tasks which the universities must be able to undertake in the shortest possible time.

1) A combination of the most costly assumption gives the figure of Frs.12,900.

CONCLUSION

In the foregoing paper it was not possible to present the specific work of a particular university, nor to consider the "non-evaluable" consequences of the research: e.g. sensitisation of a number of persons responsible for dealing with management problems, reorganisation of certain sectors, improvement of the system of information.

As for the results which were obtained by what might be called an application exercise, it is unnecessary to emphasize once more that they must be interpreted with very great caution. But knowledge advances through imperfection: having acknowledged the imperfection, we must now try to reduce it.

Perhaps it should be pointed out that the retrospective knowledge of costs is only a stage, not a goal in itself; even if much time and effort have been spent on the thankless task of collecting data, screening information, studying the teacher time budget or the functioning of services, it should be remembered that such work is meaningful only when placed in its true perspective i.e. the improvement of the decision-making and management procedures of the university system.